<u>Amendments to the Claims:</u>

This listing of claims will replace all prior versions, and listings, of claims in the application:

<u>Listing of Claims:</u>

1. – 3. (Cancelled)

4. (Withdrawn) The method of claim 1 wherein said irradiating comprises irradiating said container with a tritium produced beam of neutrons.

5. (Withdrawn) The method of claim 1 wherein said irradiating comprises irradiating said container with a gamma-ray beam capable of adding sufficient energy to the nucleus of the special nuclear material to overcome the fission barrier and thus induce a fission in the special nuclear material.

6. – 7. (Cancelled)

8. (Withdrawn) The method of claim 6 wherein said short-lived gamma rays comprise gamma rays that have a half-life that is smaller than approximately thirty seconds.

9. (Cancelled)

10. (Withdrawn) The method of claim 6 wherein said high-energy gamma rays are gamma-ray that have an energy that is higher than approximately 4MeV.

11. (Withdrawn) The method of claim 1 wherein said detecting is conducted using a germanium detector.

12. (Withdrawn) The method of claim 1 wherein said detecting is conducted using a liquid scintillation detector.

13. – 14. (Cancelled)

15. (Withdrawn) The method of claim 1 wherein said detecting is conducted for a time period after the cessation of said irradiating.

16. – 18. (Cancelled)

19. (Withdrawn) The method of claim 16 wherein said energy characteristics comprises a measure of the time dependence of the yield of the gamma rays.

20. – 23. (Cancelled)

24. (Withdrawn) The method of claim 22 wherein said energy threshold value is approximately 4 MeV.

25. – 26. (Cancelled)

27. (Withdrawn) The method of claim 25 wherein said half-life threshold value is approximately between 20 and 30 seconds.

28. – 29. (Cancelled)

30. (Withdrawn) A system for detecting the presence of special nuclear materials in a container, comprising:

an energetic beam source configured for irradiating the container, so as to induce a fission in the special nuclear materials;

a detector configured for detecting the gamma rays that are emitted from the fission products formed by said fission, to produce a detector signal;

a comparator for comparing the detector signal with a threshold value to form a comparison; and

a presence detector for detecting the presence of the special nuclear materials using the comparison.

31. (Withdrawn) The system of claim 30 wherein said energetic beam source comprises a beam of neutrons.

32. (Withdrawn) The system of claim 30 wherein said energetic beam source comprises a deuterium neutron source.

33. (Withdrawn) The system of claim 30 wherein said energetic beam source comprises a tritium neutron source.

34. (Withdrawn) The system of claim 30 wherein said energetic beam source comprises a gamma-ray beam capable of adding sufficient energy to the nucleus of the special nuclear material to overcome the fission barrier and thus induce a fission in the special nuclear material.

35. (Withdrawn) The system of claim 30 wherein said energetic beam source is configured for irradiating said container in order to induce a thermal fission in the special nuclear materials and to produce short-lived and high-energy gamma rays that are emitted from the resulting fission products.

36. (Withdrawn) The system of claim 35 wherein said short-lived gamma rays comprise gamma rays that have a half-life that is smaller than approximately 1 minute.

37. (Withdrawn) The system of claim 35 wherein said short-lived gamma rays comprise gamma rays that have a half-life that is smaller than approximately thirty seconds.

38. (Withdrawn) The system of claim 35 wherein said high-energy gamma rays are gamma-ray that have an energy that is higher than approximately 3MeV.

39. (Withdrawn) The system of claim 35 wherein said high-energy gamma rays are gamma-ray that have an energy that is higher than approximately 4MeV.

40. (Withdrawn) The system of claim 30 wherein said detector comprises a germanium detector.

41. (Withdrawn) The system of claim 30 wherein said detector comprises a liquid scintillator detector.

42. (Withdrawn) The system of claim 30 wherein said detector comprises a plastic scintillator detector.

43. (Withdrawn) The system of claim 30 wherein said detector is configured to detect the gamma rays after a time period after the cessation of said irradiating.

44. (Withdrawn) The system of claim 30 wherein said detector is configured to detect said gamma rays for a time period after the cessation of said irradiating

45. (Withdrawn) The system of claim 30 wherein said detector is configured for detecting the energy characteristics of the gamma rays.

46. (Withdrawn) The system of claim 45 wherein said energy characteristics comprises an energy spectrum of the gamma rays.

47. (Withdrawn) The system of claim 46 wherein said energy spectrum comprises a measure of the number of detected gamma-rays as a function the energies of the detected gamma rays.

48. (Withdrawn) The system of claim 45 wherein said energy characteristics comprises a measure of the time dependence of the yield of the gamma rays.

49. (Withdrawn) The system of claim 30 wherein said comparator is configured for comparing the energy level of the detected signal with an energy threshold value.

50. (Withdrawn) The system of claim 30 wherein said comparator is configured for comparing the time dependence of the detected gamma ray yields with a half-life threshold value.

51. (Withdrawn) The system of claim 30 wherein said presence detector is configured to detect said presence when the energy of the detected gamma rays is higher than an energy threshold value.

52. (Withdrawn) The system of claim 51 wherein said energy threshold value is approximately 3 MeV.

53. (Withdrawn) The system of claim 51 wherein said energy threshold value is approximately 4 MeV.

54. (Withdrawn) The system of claim 30 wherein said presence detector is configured to detect said presence when the half-life of the detected gamma rays is less than a half-life threshold value.

55. (Withdrawn) The system of claim 54 wherein said half-life threshold value is approximately 20 seconds.

56. (Withdrawn) The system of claim 54 wherein said half-life threshold value is approximately between 20 and 30 seconds.

57. (Withdrawn) The system of claim 30 wherein said presence detector is configured to detect said presence when the energy of the detected gamma rays is higher than an energy threshold value and when the half-life of the detected gamma rays is less than a half-life threshold value.

58. (Withdrawn) A system for detecting the presence of special nuclear materials in a container, comprising:

an energetic beam source configured for irradiating the container in order to induce a fission in the special nuclear materials and to produce short-lived and high-energy gamma rays that are emitted from the resulting fission products;

a detector configured for detecting the gamma rays that are emitted from the fission products formed by said fission, to produce a detector signal;

a comparator for comparing the detector signal with a threshold value to form a comparison; and

a presence detector for detecting the presence of the special nuclear materials using the comparison, wherein said presence detector is configured to detect said presence when the

energy of the detected gamma rays is higher than an energy threshold value and when the half-life of the detected gamma rays is less than a half-life threshold value.

59. (Withdrawn) A system for detecting the presence of special nuclear materials in a container, comprising:

means for irradiating the container with an energetic beam, so as to induce a fission in the special nuclear materials;

means for detecting the gamma rays that are emitted from the fission products formed by said fission, to produce a detector signal;

means for comparing the detector signal with a threshold value to form a comparison; and

means for detecting the presence of the special nuclear materials using the comparison.

60. (Withdrawn) The system of claim 59 wherein said means for irradiating comprises an energetic beam source configured for irradiating said container in order to induce a fission in the special nuclear materials and to produce short-lived and high-energy gamma rays that are emitted from the resulting fission products

61. – 69. (Cancelled)

70. (Withdrawn) A method of interrogating a container, comprising the steps of:

a) irradiating the container for approximately 30 seconds with neutrons having energies between about 2.45 and 14 MeV or with a gamma ray beam having an energy of at least 10 MeV;

b) stopping the irradiating;

c) after stopping the irradiating, counting β-delayed gamma rays having an energy range between about 3 and 6 MeV for approximately 30 seconds;

d) making a first plot comprising number of β-delayed gamma rays counted in step c as a function of β-delayed gamma ray energy to produce an observed energy spectrum;

e) making a second plot of the total number of β-delayed gamma rays counted in a portion of the energy range as a function of time in order to determine an effective half-life;

f) comparing the observed energy spectrum with known energy spectra produced by fission products of special nuclear materials; and

g) concluding that there are special nuclear materials in the container when:

the observed energy spectrum and the known energy spectra have the same overall shape; and

the observed effective half-life is approximately 20 to 30 seconds or less.

71. (Previously Presented) The method of Claim 80 wherein the neutrons comprise D-D neutrons.

72. (Previously Presented) The method of Claim 80 wherein the neutrons comprise D-T neutrons.

73. (Previously Presented) The method of Claim 80 wherein the gamma ray beam has an energy between approximately 10 and 30 MeV.

74. (Previously Presented) The method of Claim 80 wherein a plastic or liquid scintillation detector is used for the counting step.

75. (Withdrawn) The method of Claim 70 wherein the portion of the energy range is between approximately 3 and 4 MeV.

76. (Withdrawn) The method of Claim 70 wherein the portion of the energy range is between approximately 4 and 6 MeV.

77. (Previously Presented) The method of Claim 80 wherein, in step g, the observed energy spectrum and the known energy spectra having the same overall shape comprises having the same overall shape wherein the number of β-delayed gamma rays decreases as the energy increases at energies greater than approximately 3 MeV.

78. (Withdrawn) The method of Claim 70 wherein:

the container has dimensions of approximately 8 feet by 40 feet by 8.5 feet and is made of steel;

the container holds at least 500 grams of Pu-239;

the neutrons have an energy of 14 MeV;

the neutrons have a flux of approximately 3.8×10^4 neutrons/cm^2 sec at a distance of approximately 15 feet from the container;

detectors surrounding the container on at least three sides and having at least 10% efficiency are used for the counting; and

at least 1000 β-delayed gamma rays with energies above 3 MeV are counted.

79. (Currently Amended) The method of Claim 80 wherein:

the container has dimensions of approximately 8 feet by 40 feet by 8.5 feet and is made of steel;

the container holds at least 500 grams of U-235;

the neutrons have an energy of approximately 14 MeV;

the neutrons have a flux of approximately 3.8×10^4 neutrons/cm^2 sec at a distance of approximately 15 feet from the container;

detectors surrounding the container on at least three sides ~~and having at least 10% efficiency~~ are used for the counting; and

at least 350 β-delayed gamma rays with energies above 3 MeV are counted.

80. (Currently Amended) A method of interrogating a container, comprising the steps of:

a) irradiating the container for approximately 30 seconds with neutrons having energies between about 2.45 and 14 MeV or with a gamma ray beam having an energy of at least 10 MeV;

b) stopping the irradiating;

c) after stopping the irradiating, counting β-delayed gamma rays having an energy range between about 3 and 6 MeV for approximately 30 seconds;

d) making a first plot comprising number of β-delayed gamma rays counted in step c as a function of β-delayed gamma ray energy to produce an observed energy spectrum;

e) making a second plot of the total number of β-delayed gamma rays counted in a portion of the energy range between about 3 and 4 MeV as a function of time in order to determine an effective half-life;

f) comparing the observed energy spectrum with known energy spectra produced by fission products of U-235; and

g) concluding that there U-235 in the container when:

the observed energy spectrum and the known energy spectra have the same overall shape; and

the observed effective half-life is approximately 20 to 30 seconds ~~or less~~.